3.4 WATER AND AQUATIC SEDIMENT QUALITY

This section addresses water and aquatic sediment quality based on site visits and various technical studies. Most recent are studies completed by Moffatt & Nichol (M&N) for this restoration effort including the Water Quality Study (Appendix E), Sediment Characterization Study (2010), and SAP (Appendix A). In addition, monitoring data collected by the SELC (2002), the RWQCB (1994, 2010), and MACTEC Engineering (2009) were also evaluated. Water quality within the lagoon during restoration, as well as nearshore and offshore water quality in the ocean during materials disposal/placement activities, is addressed within this section. The aquatic sediment quality analysis addresses the suitability of material for disposal/placement at proposed sites from both a contamination and grain size perspective. To characterize chemical suitability of the project sediments, National Oceanic and Atmospheric Administration (NOAA) numerical sediment quality guidelines (SQGs) for aquatic sediment were used as an informal, interpretive tool, which include two SQG concentrations thresholds:

- "Effects Range-Low" (ERL), where adverse effects were not likely with concentrations below this level; and
- "Effects Range-Median" (ERM), concentrations above which adverse effects were more likely.

The SQGs do not suggest that no effects would occur below the ERL or that adverse effects would occur above the ERM. They are intended to establish statistical guidelines that can be used to rank and prioritize sites of concern and chemicals of concern (NOAA 1999). The SQGs are lengthy and applicable; ERL and ERM for trace metals and organic compounds are contained in technical reports bound separately.

Some discussion provided in this section overlaps slightly with Section 3.2 (Hydrology), such as salinity, and references are made to that section where appropriate.

3.4.1 AFFECTED ENVIRONMENT

San Elijo Lagoon Study Area

As discussed in Section 3.2 (Hydrology), San Elijo Lagoon is a coastal wetland traversed by various transportation infrastructure, leading to hydraulic inefficiencies, and is affected by urban runoff from a primarily urbanized watershed.

The mouth of the lagoon has historically been closed much of the year due to the hydraulic inefficiencies of the current channel network and inlet configuration. As a result, tidal exchange has been limited within the lagoon, resulting in the historical accumulation of fine sediments in the east and central basins of the lagoon (USDA 1993) and water quality issues in the lagoon. Although the SELC currently maintains a predominantly open inlet condition, muted tidal flow that occurs even under open inlet conditions contributes to decreased water quality and near-stagnant conditions, particularly in the east basin where flushing is most limited. The manual opening of the tidal inlet conducted by the SELC maintains a degree of tidal flushing; however, poor circulation and water quality issues within the lagoon still exist, particularly if the inlet closes. When the inlet closes, the water column within the lagoon can become eutrophic within a 24-hour period under certain conditions due to the nutrient load in the historic sediments (McLaughlin 2010).

Beneficial Uses

The RWQCB defines beneficial uses of water bodies within the San Diego basin in the *Water Quality Control Plan for the San Diego Basin* (Basin Plan). Beneficial uses form the cornerstone of water quality protection under the Basin Plan. Based on beneficial use designation, water quality objectives are established to help maintain or enhance water quality to support these uses for the long term. Beneficial uses of San Elijo Lagoon are listed in the Basin Plan (RWQCB 1994) but broadly include contact and noncontact water recreation plus support for estuarine, wildlife, and marine habitat. Beneficial uses of the Pacific Ocean within the Carlsbad Hydrologic Unit include recreation and numerous elements to support wildlife and marine habitat, plus navigation and fishing/shellfish harvesting.

Beneficial uses of the San Elijo Groundwater Basin include agricultural supply, industrial service supply and municipal supply (potential) (RWQCB 1994). It should be noted, however, that beneficial uses of the aquifer west of I-5 are affected by seawater intrusion, which decreases quality and potential use for the activities described above. Furthermore, previous studies indicate that there is no substantial hydraulic interaction between the aquifer and the lagoon. As with the hydrology analysis in Section 3.2 (Hydrology), the topic of groundwater is not discussed further.

Water and Sediment Quality Objectives and Criteria

Water quality objectives (WQOs) related to bacteria are shown in Table 3.4-1. The beneficial uses of the lagoon include contact recreation and noncontact recreation. Because the adjacent ocean waters are designated for shellfish harvesting, the most stringent limit applies.

Table 3.4-1
Applicable Water Quality Objectives for Bacteria

Water Quality Objectives	Concentrations			
	Individual Sample	10% of Samples	20% of Samples	Average
Contact Recreation	NA	400/100 ml	NA	200/100 ml
Noncontact Recreation	NA	4,000/100 ml	NA	2,000/100 ml
Bays and Estuaries	10,000/100 ml	NA	1,000/100 ml	1,000/100 ml
Shellfish Harvesting	NA	230/100 ml	NA	70/100 ml

ml = milliliters; NA = not applicable.
Source: RWQCB 1994

The following WQOs also apply to the proposed study area (RWQCB 1994):

- Lagoon dissolved oxygen (DO) levels cannot be less than 5.0 milligrams per liter (mg/L) and the annual mean concentration cannot be less than 7 mg/L more than 10 percent of the time. Ocean waters cannot have DO levels less than 10 percent from the normal.
- Changes in normal ambient pH levels cannot exceed 0.2 units in the lagoon.
- Oil and grease cannot be visibly present on surface waters.
- Pesticides cannot be present in the water column, sediments, or biota at concentrations that adversely affect beneficial uses or human health, wildlife, or aquatic organisms.
- Radionuclides cannot be present in concentrations that are deleterious to human, plant, animal, or aquatic life and cannot result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.
- The suspended sediment load and suspended sediment discharge rate of surface waters cannot be altered in a manner that would cause nuisance or adversely affect beneficial uses.
- Waters cannot contain suspended and settleable solids that cause nuisance or adversely affect beneficial uses.
- The natural temperature of a receiving water body cannot be altered unless the alteration can be shown to not adversely impact beneficial uses.

The Basin Plan also states that water should be maintained free of toxic substances in concentrations that are toxic to, or produce negative physiological responses in, human, plant, animal, or aquatic life. A list of toxic substances and their numerical limits is provided in 40 CFR 131.36, which includes polychlorinated biphenyls (PCBs) and the pesticides DDT, DDE, and DDD.

According to the CWA Section 303(d) list of impaired water bodies, San Elijo Lagoon is listed as being impaired (or polluted) by eutrophic conditions (oversaturated nutrients), indicator bacteria, and sedimentation/siltation (RWQCB 2010). These conditions have originated from unspecified point and nonpoint sources (e.g., pipe discharges and runoff, respectively). The Pacific Ocean shoreline near the mouth of the lagoon is listed for total coliform bacteria.

Salinity

Salinity levels in San Elijo Lagoon can fluctuate during storm events, with levels ranging from an ocean salinity concentration of 34 parts per thousand (ppt) to freshwater conditions of less than 5 ppt. These fluctuations and the resulting low salinity conditions in the lagoon can impact salt marsh habitats that typically depend on higher salinity levels. According to the Water Quality Study (M&N 2012c), the east basin can completely fill with freshwater during a storm event and freshwater conditions can remain for approximately 1 week following the storm. This is due to poor water circulation and drainage out of the lagoon caused by flow constrictions at the I-5 bridge and the tidal inlet at Coast Highway 101. The central basin can also fill with freshwater during a storm event; however, the western portion of the basin is closer to the ocean and experiences greater tidal influence, receiving regular mixing between ocean and freshwater during incoming and outgoing tides. The west basin, closest to the tidal inlet, experiences the greatest tidal influence and maintains higher salinity levels during and after storm events due to limited circulation within the basin. Overall, salinity levels in the lagoon depend on efficient tidal exchange, with better circulation resulting in more rapid salinity recovery.

Based on a 24-hour SELC salinity study in 2002 with freshwater urban runoff input (SELC 2002), salinity is less stratified at stations near the ocean inlet and more stratified upstream near the I-5 bridge. The study revealed the following:

- Salinity of the freshwater input to the lagoon’s east basin (through the culvert in the CDFW dike) was consistently 1.2 ppt at the surface and bottom of the water column.
- Average salinity in the lagoon was approximately 15 ppt.
- Salinity in the offshore area and the ocean boundary was 34 ppt.

Nutrients

Excessive concentrations of nutrients such as nitrogen and phosphorus can lead to algal blooms that in turn promote eutrophication and hypoxia (depressed DO) that can stress aquatic organisms and cause unpleasant odors. The WQOs set by the Basin Plan (RWQCB 1994) are 0.025 mg/L for ammonia and an allowable exceedance of 10 percent for nitrite and nitrate

(N+N), total nitrogen (TN), and total phosphorus (TP). Chlorophyll ‘a’ has a water quality related benchmark of 20 micrograms per liter (µg/L).

A 2009 study was conducted to measure nutrients in and around the lagoon at the following locations (MACTEC 2009):

- Segment 1 of the lagoon near the I-5 overpass
- Segment 2 near the visitor’s center
- Lagoon inlet
- Escondido Creek at the Camino del Norte Bridge mass emission station

At the Escondido Creek mass emission site upstream from the lagoon, monitoring results indicate the following:

- TN, TP, and ammonia for both dry and wet weather conditions exceeded their respective WQOs for nutrients/eutrophication.
- The mean concentration of chlorophyll ‘a’ during the dry period did not exceed the benchmark; chlorophyll-a was not analyzed during storm events.
- N+N concentrations did not exceed the WQO in any sample.

At the lagoon sites, monitoring results indicate that:

- The mean ammonia concentration exceeded the WQO under both wet and dry weather conditions. Mean concentrations during wet weather were 0.04 mg/L at all three lagoon sampling sites. During dry weather, mean concentrations were 0.12 mg/L at Segment 1 and 0.05 mg/L at both Segment 2 and the lagoon inlet. In total, during dry weather, 90 percent and 55 percent of samples exceeded the WQO at Segments 1 and 2 and the lagoon inlet, respectively.
- The mean concentration of chlorophyll ‘a’ did not exceed the benchmark during wet weather. Mean concentrations were 17.8 µg/L at Segment 1, 13.7 µg/L at Segment 2, and 11.2 µg/L at the lagoon inlet. The mean concentration of chlorophyll ‘a’ did not exceed the benchmark at Segment 1 or the lagoon inlet during dry weather, with mean concentrations of 16.9 µg/L and 10.2 µg/L, respectively. However, the mean concentration exceeded the benchmark at Segment 2 during dry weather with a concentration of 31.5 µg/L. Of the samples in total from all three lagoon sampling sites, 17 percent exceeded the benchmark during dry weather.

- Zero percent of N+N samples exceeded the WQO under both wet and dry weather conditions.
- Between 13 to 83 percent of samples at the three sampling stations under both wet and dry weather conditions exceeded the WQO for TN. During wet weather, 83 percent of samples exceeded at Segment 1, and 33 percent exceeded at Segment 2 and the lagoon inlet. During dry weather, 58 percent of samples exceeded at Segment 1; 27 percent exceeded at Segment 2, and 13 percent exceeded at the lagoon inlet.
- Between 27 to 100 percent of samples at each site under both weather conditions exceeded the WQO for TP. During wet weather, 100 percent of samples exceeded at all three lagoon sampling sites. During dry weather, 92 percent exceeded at Segment 1; 54 percent exceeded at Segment 2, and 27 percent exceeded at the lagoon inlet.

The water concentrations of these constituents were, with some exceptions, only slightly greater than WQOs. In some instances, the mean concentration was lower than the WQO, but several samples that exceeded the WQO resulted in an exceedance rate that was slightly greater than the 10 percent allowable exceedance frequency. Additionally, concentrations for TN and TP in San Elijo Lagoon were below historical concentrations (M&N 2012c).

Nutrient levels affect the DO levels in the water column, which are an important parameter for sustaining aquatic life. High nutrient levels can cause algae growth; algae can affect DO by releasing oxygen during the day, and by respirating and pulling DO out of the water column at night, thus lowering DO levels. Algae are also a sign of poor circulation and potentially compromised water quality for organisms. San Elijo Lagoon had a DO level that fell below the single sample minimum concentration (5 mg/L) between 30 and 50 percent of the time. Most of the DO concentrations that fell below the single-sample minimum occurred during the summer and fall (M&N 2012c).

Coliform Bacteria

Bacteria can be harmful to the health of organisms and humans. For indicator bacteria, including coliform and *Enterococcus*, MACTEC monitoring results indicate:

- For wet weather conditions, all three indicator bacteria (fecal and total coliform and *Enterococcus*) concentrations at the mass emission station (Camino del Norte Bridge) exceeded Assembly Bill (AB) 411 water quality standards for body contact. Bacteria results within the lagoon also exceeded the standard during the wet weather conditions, although the concentrations are lower than those at the mass emission site.

- For dry weather conditions, *Enterococcus* concentrations exceeded the AB 411 standard at both the mass emission station and lagoon sites, fecal coliform exceeded the standard at the mass emission station and Segment 1 downstream of I-5 Bridge, and there were no exceedances for total coliform. Dry weather periods do not generally appear associated with beneficial use impairments from bacteria for San Elijo Lagoon.

Wet weather water samples had higher bacterial concentrations than dry weather samples, suggesting that nonpoint sources are the primary contributors to elevated bacteria concentrations and annual loadings to the lagoon. Also, as wet weather flows contribute between 84 and 98 percent of the total annual flow volume, nearly all of the bacteria loadings into the lagoon are during wet weather storm events. Within the lagoon, concentrations during the winter were the highest. The highest exceedance frequencies were associated with *Enterococcus* and fecal coliform (M&N 2012c).

Sediment

Sediment can also degrade water quality if present in sufficient concentrations. The lagoon is listed as impaired for sedimentation/siltation. Sediment in the water column is referred to as total suspended solids (TSS), which can indicate available solids that are in suspension that can deposit in the lagoon (or elsewhere) when water conditions are suitable (i.e., slower velocities). In 2009, TSS was measured during both wet and dry weather at San Elijo Lagoon (MACTEC 2009). At the inflow measurement point in Escondido Creek (mass emission site), TSS mean concentrations were highest during high flow wet weather conditions. During winter dry weather conditions, the mean concentrations were the lowest of all periods of the year. Spring season TSS mean concentrations were higher than TSS mean concentrations during other seasons (M&N 2012c).

Wet weather samples from Escondido Creek were also analyzed for grain size distribution. More than 80 percent of the samples had silt/clay grain sizes (M&N 2012c). Smaller suspended particles (< 10 microns [µm]) generally remain suspended in the water column and do not settle out as fast, as opposed to larger suspended particles that settle fairly quickly. Sediment in the lagoon from upstream sources is predominantly fine material.

At the lagoon sites, TSS concentrations did not appear to correlate to particular sample times during any of the three monitored events. TSS mean concentrations at the lagoon sites are greater than that of the mass emission station farther upstream during dry weather conditions (M&N 2012c). Sediment near the lagoon inlet is a result of flood shoaling from tidal waters. The flood shoal constricts the inlet and prevents further tidal intrusion and flushing.

A chemical analysis of sediments in San Elijo Lagoon has been conducted in accordance with the ITM as discussed in the SAP (Appendix A). A total of 55 subsurface explorations (borings) were performed in the east, central, and west basins. The borings took samples from upper and lower layers of sediments and were characterized by shallow and deep borings. Boring depths were located based on the proposed depth of cut in the area being sampled. Shallow borings extended approximately 8 feet below ground surface (bgs) and deep borings extended to a depth of 30 feet bgs. The chemical analysis showed that most of the tested analytes fell below their respective ERLs. The analytes that met or exceeded their ERL and/or ERM are shown in Table 3.4-2.

Table 3.4-2
Sediment Contaminant Concentrations (M&N 2013)

Area of Lagoon	Sample Composite ID	Contaminant	ERL (µg/kg)	ERM (µg/kg)	Sample Concentration (µg/kg)
West Basin	WB-COMP-SB-Upper	4,4'-DDE	2.2	27	2.2
Central Basin	CB-COMP-South-Upper	4,4'-DDE	2.2	27	6.5
Central Basin	CB-COMP-NW-Upper	4,4'-DDE	2.2	27	3.1
Central Basin	CB-COMP-NW-Upper	4,4'-DDD	2.0	20	2.8
East Basin	EB-COMP-North-Upper	Aroclor PCBs	22.7	180	39
East Basin	EB-COMP-South-Lower	Aroclor PCBs	22.7	180	92
Overdredge Pit	WB/CB-COMP-D-Upper	4,4'-DDD	2	20	3.9
Overdredge Pit	WB/CB-COMP-D-Upper	4,4'-DDE	2.2	27	5.7
Overdredge Pit	**WB/CB-COMP-D-Upper**	**4,4'-DDT**	**1**	**7**	**12.6**

µk/kg = micrograms per kilogram

Only the concentration for DDT in the upper layer of the overdredge pit location in the central basin exceeded its ERM. This material would not be used for the materials reuse component of the proposed project, but would be disposed of off-site at LA-5 (Alternative 1A) or on-site in the overdredge pit created in the central basin (Alternative 2A and Alternative 1B). Following on-site placement of this material, the overdredge pit would be capped by sand material removed from the proposed inlet location, which would encapsulate the material and prevent it from being introduced in the water column or released into the environment (M&N 2013).

Materials Disposal/Reuse Locations

Areas available for materials disposal/reuse are located on-site, and at onshore, nearshore, or offshore sites (Figure 1-3). Water quality for ocean waters tends to be more homogenous than fluvial waters due to the dilution effect of the ocean.

Beneficial Uses

Beneficial uses for the Pacific Ocean are broad (RWQCB 1994) and include contact and noncontact water recreation, commercial and sport fishing, preservation of biological habitats of special interest, spawning, reproduction and early development, and shellfish harvesting.

Water Quality Objectives

Both the SWRCB and the California Department of Public Health (DPH) have established standards to protect water contact recreation in coastal waters from bacterial contamination. The SWRCB and DPH water contact bacterial objectives are as follows(SWRCB 2012):

- 30-day Geometric Mean
    - Total coliform shall not exceed 1,000 per 100 milliliters (ml);
    - Fecal coliform density shall not exceed 200 per 100 ml; and
    - *Enterococcus* density shall not exceed 35 per 100 ml.
- Single Sample Maximum
    - Total coliform density shall not exceed 10,000 per 100 ml;
    - Fecal coliform density shall not exceed 400 per 100 ml;
    - *Enterococcus* density shall not exceed 104 per 100 ml; and
    - Total coliform density shall not exceed 1,000 per 100 ml when the fecal coliform/total coliform ratio exceeds 0.1.

The Ocean Plan (SWRCB 2012) outlines the following narrative WQO for the physical characteristics of ocean waters in California:

- No floating particulates and grease and oil can be visible.
- The discharge of waste cannot cause aesthetically undesirable discoloration of the ocean surface.
- Natural light cannot be significantly reduced at any point outside the initial dilution zone as the result of the discharge of waste.
- The rate of deposition of inert solids and the characteristics of inert solids in ocean sediments cannot be changed such that benthic communities are degraded.

The Ocean Plan (SWRCB 2012) outlines the following narrative WQO for the chemical characteristics of ocean waters in California:

- Dissolved oxygen concentration cannot be depressed more than 10 percent from that which occurs naturally from the discharge waste materials.
- The pH cannot be changed more than 0.2 units from that which occurs naturally.
- Dissolved sulfide concentration of waters in and near sediments cannot be significantly increased above that present under natural conditions.
- The concentration of substances in Chapter II, Table B, in marine sediments cannot degrade indigenous biota.
- The concentration of organic materials in marine sediments cannot degrade marine life.
- Nutrient materials cannot cause objectionable aquatic growths or degrade indigenous biota.

The quantitative WQOs for chemical constituents can be found in Table B of the Ocean Plan (SWRCB 2012).

As noted in the introduction of this section, NOAA uses numerical ERL and ERM SQGs for aquatic sediment as concentrations that can be used to rank and prioritize sites of concern and chemicals of concern.

Areas of Special Biological Significance

Two Areas of Special Biological Significance (ASBS) sites are in the vicinity of the project: the La Jolla ASBS #29 and the Scripps ASBS #31. In 1983, the SWRCB Ocean Plan officially prohibited polluted runoff and discharges into an ASBS by requiring that runoff and discharge sources be located a sufficient distance to maintain natural water quality conditions. Stormwater runoff and coastal river discharges can cause large turbidity plumes and reduce near-surface salinity up to several miles, while adding suspended sediments, nutrients, bacteria/pathogens, and chemical contaminants to nearshore waters during storm events. The Torrey Pines materials disposal/reuse site is approximately 2 miles north of the Scripps ASBS and the La Jolla ASBS is farther.

Physical Parameters

During late spring through fall, solar heating of the ocean surface creates temperature gradients in the water column (thermocline) that induce correlating density gradients (pycnocline), which can restrict vertical mixing of most water quality parameters (SANDAG 2011). During winter and early spring, thermoclines are weakest in response to reduced insolation (solar heating) and increased mixing from winter storm activity and upwelling of deeper ocean waters.

Seasonal upwelling and downwelling affect marine water quality along the San Diego coast. Upwelling is initiated when wind patterns displace surface waters offshore, resulting in an upward replacement of colder, deeper waters with lower DO concentrations, and higher salinity and nutrient concentrations. Upwelling is generally present from late March through July in the San Diego County area. Downwelling occurs when wind forces surface water onshore and forces it downward, causing warmer temperature and lower salinity in deeper waters.

Temperature

Surface water temperature along the coast of San Diego varies seasonally with solar heating, upwelling, and climatic conditions, ranging from approximately 53.6 degrees Fahrenheit (°F) in winter to 69.8°F in summer. Temperatures of bottom waters in the project area range from approximately 48.2°F to 60.8°F. Waters are stratified during the summer and early fall, unstratified during the winter, and transitional (e.g., stratification weakening or increasing) in late fall and spring.

Salinity

Salinity in nearshore portions of the Southern California Bight is fairly uniform, ranging from approximately 32 to 34 ppt. Salinity tends to be homogenous throughout the water column, with differences between the surface and the bottom typically less than 1 ppt. Some seasonal and/or spatial differences in salinity may reflect upwelling of denser, more saline bottom waters or discharges of freshwater runoff from coastal wetlands and creeks (SANDAG 2011).

pH

Typical pH values for nearshore coastal waters range from 7.7 to 8.4. Slightly higher pH values may occur during May through September when water temperatures are warmer. Depth-related changes in pH typically are minimal.

Sediment/Turbidity

The clarity of nearshore coastal waters is dependent on localized and temporal changes induced by coastal river and lagoon discharges (normal tidal exchange and/or urban/stormwater runoff), and plankton blooms. Waters may be more turbid in the winter due to greater wave energy, surface runoff, and river discharges, although seasonal patterns are also subject to considerable variation in storm magnitude and duration. Runoff-related discharges and associated natural turbidity tend to occur in pulses rather than as continual discharges or consistent seasonal inputs. Water clarity in spring and summer also may reflect plankton blooms (e.g., red tides) and suspended particles concentrating near the thermocline.

Rip currents also influence nearshore turbidity by transporting higher turbidity water beyond the surf zone. TSS concentrations of more than 1,000 mg/L were measured in rip currents off Imperial Beach (SANDAG 2011). Generally, rip currents are more pronounced during high wave conditions associated with higher tides, high winds, and/or storm swells. In general, water clarity and light transmittance tend to increase with distance from shore.

Similar to transmissivity values, TSS concentrations typically are relatively lower offshore than nearshore. TSS concentrations ranged from <1 to 47 mg/L offshore of Carlsbad over a 13-year monitoring period, with highest concentrations recorded after storm events or occasionally in the summer (probably due to phytoplankton blooms) (SANDAG 2011).

Turbidity levels may be substantially higher near the mouths of coastal lagoons due to river discharges, storm runoff, and/or algal blooms. TSS concentrations of 100 mg/L were recorded just inside Batiquitos Lagoon at the same time that concentrations of 20 mg/L were recorded in the adjacent nearshore zone during a non-storm period (SANDAG 2011).

Nutrients

Nutrient concentrations for coastal waters typically are higher near the bottom than near the surface, except during upwelling periods. Nearshore nutrient concentrations may be elevated in areas of wastewater discharge and near the outlet of rivers, lagoons, bays, and harbors. Nitrate levels in nearshore surface waters may vary from 0.1 mg/L to >8 mg/L during upwelling, and phosphate levels may range from 0.5 to 0.8 mg/L (SANDAG 2011).

Contaminants

The quality of nearshore ocean water within the project area is generally good, and water quality parameters are within Basin Plan limits. However, conditions in some areas are affected by local stormwater runoff discharges. In general, bacterial levels along the beaches in San Diego County are elevated occasionally by stormwater runoff.

3.4.2 CEQA THRESHOLDS OF SIGNIFICANCE

A significant impact related to water and aquatic sediment quality would occur if implementation of the SELRP would result in:

A. Changes in hydrological conditions causing sedimentation in downstream areas and/or alterations in circulation patterns that substantially inhibit vertical mixing of water or promote stagnation (lagoon restoration only);

B. Pollutants generated or released to the environment in violation of applicable federal or state standards, hazardous to human health, or deleterious to biological communities; or

C. Disposal of dredged sediments/excavated soils that would cause substantial adverse changes to water or sediment quality, toxicity or bioaccumulation of contaminants in aquatic biota, or declines in wildlife habitat (materials disposal/reuse only).

The CEQA thresholds of significance for water and aquatic sediment quality were derived from thresholds used in the EIR/EIS for the San Dieguito Wetland Restoration Project (SCH #98061010).

3.4.3 ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental consequences, or impacts, associated with the proposed project related to water and aquatic sediment quality. Potential adverse, significant, or beneficial direct and indirect impacts are identified as appropriate.

Lagoon Restoration

Alternative 2A–Proposed Project

<u>Temporary</u>

There is the potential for temporary water quality impacts to occur during construction activities, including dredging. Construction activities associated with Alternative 2A have the potential to impact water quality through the release of pollutants such as sediment, soil stabilization residues, oil and grease, and trash and debris. Soil disturbance would expose soil to erosion from wind and water that could also result in sedimentation to receiving surface waters. Temporary construction activities could cause significant adverse impacts to water or sediment quality. A variety of appropriate BMPs would be required under the General Construction Permit to protect water quality, minimize erosion, and avoid sediment transport during construction. Specific conditions included during the 401 permitting process with the RWQCB would manage sediment, nutrients, and bacteria during construction because the lagoon has been 303(d) listed for those constituents. See Table 3.4-3 below for the typical BMPs that would be used during construction activities (PDF-21). As discussed in Section 2.10, several construction methods would be employed that would minimize water quality issues. For instance, actively managing water levels by temporarily diking off portions of the lagoon being actively dredged would help to prevent release of disturbed sediment to the coast (PDF-22). This strategy would control the flow of turbid, disturbed waters and allow for some settling of sediment and other potential pollutants. A cutterhead suction dredge would be used, which would avoid/minimize the generation of turbidity at the location of the dredge (PDF-22). In addition, following on-site placement of the overdredge material, the overdredge pit would be capped by sand material removed from the proposed inlet location, which would encapsulate the material and prevent it from being introduced in the water column or released into the environment (M&N 2013) to help minimize sedimentation and turbidity impacts and the potential release of contaminants (PDF-22).

Although turbidity within the lagoon would be expected during active construction (e.g., during temporary flooding and dredging), the generation of turbidity would be minimized through the construction approach proposed for the project, as described above. Localized turbidity could occur during the placement of fine material at the overdredge pit during construction phases 2, 3, and 4, or when flow is released into the ocean. Nutrients could potentially become suspended within these areas of localized turbidity, temporarily increasing the potential for eutrophic conditions to develop within the lagoon. Outside of the lagoon inlet, the nearshore area is shallow and naturally turbid due to wave and wind action; turbidity would dissipate quickly from mixing and dilution. **However, because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the temporary turbidity that would be generated by lagoon restoration activities, most specifically the dredging operations, would be considered a potentially significant impact (Criterion A). No substantial adverse impacts would occur under NEPA due to PDFs and regulatory requirements that would be met.**

The vertical (depth-related) extent of plumes depends on the initial displacement of bottom sediments, physical characteristics and settling velocities of the sediment particles, and vertical mixing characteristics of the water column. For example, the vertical distribution of sand-sized particles disturbed by a cutterhead dredge may be confined to the near-bottom water layer once it is discharged from the dredge pipe, particularly when the bottom sediments consist of coarse-grained, rapid-settling particles and a natural density gradient is present in the water column that limits vertical mixing. In contrast, disturbed fine-grained sediments may remain suspended and distributed throughout the water column for long periods, particularly during winter (unstratified) conditions. The estimated plume distance on any given day would vary according to the grain size characteristics of the material, turbulence, current speed, and to what depth in the water column the particles are resuspended.

There is also the potential for temporary sediment quality impacts to occur as a result of the release of pollutants (e.g., oil and grease, nutrients, pesticides, PCBs, metals) from dredging, which could adhere to lagoon sediments. Based on the SAP (Appendix A), as discussed above, the majority of pollutants analyzed were below their respective ERLs. Only the DDT concentration in the upper layer of sediment of the overdredge pit location in the central basin exceeded its ERM. The implementation of BMPs to protect water quality by controlling pollutant discharge from land-based construction areas (e.g., spill prevention and control, stockpile management) would reduce/minimize potential impacts to sediment quality during construction activities. In addition, pollutant release associated with localized temporary turbidity caused by dredge equipment would be minimized through implementation of aquatic-based BMPs (e.g., flocculants, silt curtains in tributary channels). As a result of BMP implementation required in compliance with the General Permit and the County MS4 Permit, as well as any additional specific conditions that would be identified as part of the 401 permit process with the RWQCB to address 303(d) impairments, temporary construction activities are not anticipated to impact sediment quality beyond existing conditions.

As discussed in Section 3.2 (Hydrology), the Construction General Permit requires the development of a project SWPPP that identifies BMPs that would be used to prevent pollutant discharge. In addition, a SWMP would be prepared in compliance with the County MS4 Permit (PDF-21), and specific BMPs may also be incorporated as conditions of the 401 permit process with the RWQCB. Per the County MS4 Permit, storm water discharges from the site would not be allowed to contain sediments that differ in composition or in amounts in excess of the sediments that would have been discharged from the site in an undisturbed condition. Through implementation of the SWPPP, SELC would provide protection of the grading perimeter and environmentally sensitive areas. Protection would be accomplished through use of such BMPs as filtration devices, silt fencing, fiber rolls, gravel bag barriers and check dams, and/or gravel inlet filters. Capture of sediment and dust would be accomplished through use of storm-drain inlet protection and construction access road stabilization. Sediment movement would be minimized from unpaved to paved areas by limiting access into/out of dirt areas; implementing stabilized construction entrances (coarse gravel, steel shaker plates, etc.); and installing fiber rolls, silt fences, or other devices approved under the County permit. Since San Elijo Lagoon is listed as impaired by eutrophic conditions, indicator bacteria, and sedimentation/siltation (CWA Section 303[d]), BMPs would target construction-related sources of nutrients and bacteria, while also minimizing the effects of sediment disturbance (e.g., erosion). See Table 3.4-3 for the typical BMPs that would be used during construction activities.

Table 3.4-3
Potential Construction-Phase BMPs

Type of BMP	Description and Purpose
Turbidity Control	
Flocculants	Promotes the coagulation of suspended particles to induce settling and decrease turbidity. Non-toxic polyacrylamide flocculants would be based on site-specific lagoon soil and water samples to maximize effectiveness. Application would be as close to the area of disturbance as possible. Flocculant would be used in tandem or combination with other BMPs presented in this table.
Jute Netting	Captures suspended in the water column, when used in conjunction with flocculant polymers to enhance coagulation of suspended particles directly on webbing. Jute netting is an organic product.
Temporary Dikes	Helps to minimize the impact of dredge-related turbidity within a localized work area. Implementation would depend on contractor preference. Used for short-term control as tidal conditions allow.
Silt Curtains	Provides similar temporary turbidity control where tidal surge is minimal. If used, they would likely be most effective in smaller tributary channels far from the lagoon mouth (i.e., higher in the watershed).
Sediment Control	
Silt Fence	Detains sediment-laden water, promoting sedimentation behind the fence. Suitable for use at edge of disturbance areas; around temporary stockpiles; along the perimeter of a site; below areas where sheet flows discharge from the site; below the toe or downslope of exposed and erodible slopes.
Fiber Rolls	Intercept runoff, reduce flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). Suitable for use along the perimeter of a site; downslope of exposed soil areas; around temporary stockpiles.
Gravel Bag Berm/Sand Bag/Straw Bale Barrier	Intercepts and ponds sheet flow runoff, allowing sediment to settle out. Suitable for use along the perimeter of a site; below the toe of slopes and erodible slopes; downslope of exposed soil areas; around temporary stockpiles; at the top of slopes to divert runoff away from disturbed slopes.
Biofilter Bags	Detain flow and allow a slow rate of discharge through the wood media; remove suspended sediment through gravity settling of the detained water and filtration within the bag. Suitable for use along the perimeter of disturbed sites; around temporary stockpiles; below the toe of slopes and erodible slopes; downslope of exposed soil areas.
Erosion Control	
Hydraulic Mulch	Sprayed onto soil surface to provide a layer of temporary protection from wind and water erosion. Suitable for disturbed areas that require temporary stabilization to minimize erosion or prevent sediment discharges until permanent vegetation is established. Can be applied in combination with seeding/planting efforts.
Soil Binders	Soil stabilizer applied to the soil surface to temporarily prevent water- and wind-induced erosion of exposed soils. Suitable for disturbed areas requiring temporary erosion and sedimentation protection until permanent vegetation is established. Can be applied in combination with seeding/planting efforts.
Straw/Wood Mulch	Reduces erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff. Suitable for disturbed areas requiring temporary erosion and sedimentation protection until permanent vegetation is established. Can be applied in combination with seeding/planting efforts.
Hydroseeding	Seed applied to soil surface to temporarily protect exposed soils from water and wind erosion. Suitable for disturbed areas requiring temporary erosion and sedimentation protection until permanent vegetation is established. Can be used to apply permanent stabilization. Hydraulic seed should be applied with hydraulic/straw mulch for adequate erosion control.

Type of BMP	Description and Purpose
Materials Management	
Spill Prevention and Control	Prevent or reduce the discharge of pollutants to watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, and properly disposing of spill materials. Cover and berm outdoor storage/equipment areas, store spill cleanup materials in clearly marked locations, and clean spills immediately. Suitable for pollutants including sediment, nutrients, trash, metals, and oil and grease.
Stockpile Management	Reduce stormwater pollution from stockpiles by locating stockpiles as far away as possible from stormwater flows, watercourses, and inlets, and covering stockpiles. Protect stockpiles from storm water runon using temporary perimeter sediment barriers such as silt fences, fiber rolls, sandbags, gravel bags, or biofilter bags.
Solid Waste Management	Prevent or reduce the discharge of pollutants from solid waste by providing waste collection areas and an adequate number of containers, arranging for regular disposal, collecting site trash daily, and cleaning up spills immediately. Suitable for construction and domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes. Targeted pollutants include sediment, nutrients, bacteria, trash, oil and grease, and metals.
Housekeeping Practices	Maintain clean and orderly work sites; dispose of wash water, sweepings, and sediments properly; recycle or dispose of fluids properly; and train contractors in BMPs and pollution prevention. Targeted pollutants include sediment, nutrients, bacteria, trash, oil and grease, and metals.

In addition, with the required implementation of BMPs, temporary impacts to additional parameters, including temperature, salinity, and pH, are not anticipated to occur. As part of compliance with the Section 401 water quality certification required from the RWQCB, water quality monitoring would be conducted to verify that water quality standards are met (PDF-43). As discussed in Section 3.15, a sediment management plan would be implemented to verify that sediments being transported and deposited are not in violation of applicable federal or state standards, hazardous to human health, deleterious to biological communities, or cause substantial adverse changes to water or sediment quality (HAZ-3).

Temporary diking and inundation of specific areas during phased construction of Alternative 2A could lead to changes in circulation that promote stagnation or reduce vertical mixing of water within the lagoon. The lagoon is currently densely vegetated and has obstructions to flow (e.g., CDFW weir) that inhibit circulation. During construction, circulation would increase for a number of reasons. As flooding is initiated and vegetation removed from the basins, the water elevation would increase and surface area would expand. The fetch across impounded areas would increase, promoting circulation and turnover. In addition, mechanically induced circulation would occur due to construction activities (dredge and support vehicles). As construction progresses and impounded areas are released and opened to tidal action, those areas would have less vegetation and greater tidal exchange, increasing circulation over existing conditions.

As a result of BMP implementation required in compliance with existing regulations (Construction Permit, MS4 Permit, and 401 Permitting), the use of a cutterhead suction dredge, and the localized temporary nature of disturbance, pollutants would not be generated or released to the environment in violation of applicable federal or state standards, hazardous to human health, or deleterious to biological communities. Changes in hydrologic conditions during construction would not cause sedimentation in downstream areas or result in alterations in circulation that would inhibit vertical mixing or promote stagnation.

With a combination of physical and regulatory measures, Alternative 2A would result in less than significant temporary impacts from target pollutants generated or released to 303(d) waters (Criteria A and B), with the exception of the impact related to turbidity. As described above, potentially significant impacts would occur due to turbidity that could result in increased downstream sedimentation (Criterion A). One of the project objectives is to improve overall water quality and the hydrology functions of the lagoon. The temporary construction and maintenance impacts to water and aquatic sediment quality, which would be minimized through a number of physical and regulatory measures, would not be substantially adverse.

<u>Permanent</u>

The proposed project would provide a long-term water quality improvement throughout the lagoon by permanently increasing circulation and tidal exchange. Alternative 2A would have the greatest beneficial impacts of the alternatives proposed since it would promote the best circulation scenario by allowing the greatest tidal influence and improving the ability to transport sediment from the lagoon to the coast.

As shown in Table 3.4-4, Alternative 2A would decrease the existing water residence time of the east basin from 15 days to 4 days, and reduce elevated bacteria concentrations in the nearshore area from approximately 8 days to 3 days.

Table 3.4-4
Water Quality Indicators for the Alternatives

Alternative	Residence Time in the East Basin (days)	Elevated Bacteria Concentration near Inlet (days)
Existing	15	8 to 9
1A	13	8 to 9
1B	8	8 to 9
2A	4	3

Source: M&N 2012c

Alternative 2A involves constructing a new tidal inlet that would substantially improve hydraulics and water quality compared to the other alternatives that modify the existing inlet. Through the improved circulation gained by the new inlet, Alternative 2A would eliminate or substantially reduce excessive sedimentation and recurrent inlet closures, substantially help to reduce the ongoing and future impacts from sedimentation/siltation blockage in the lagoon, and greatly improve tidal exchange and sediment transport to the ocean (i.e., beach sand replenishment). The duration of flood drainage would be shortened to approximately 20 percent of the duration for existing inlet alternatives (M&N 2012c). Additional tidal exchange and flushing would result in larger and heavier particle size (sand) in the western portions of the channel system where tidal flows may be faster. In the eastern portions of the project where most of the smaller, lighter sediment particles are located, tidal flushing would be slower and the channels would be more resistant to tidal erosion and resulting turbidity. This alternative would require relatively infrequent intermittent inlet maintenance (i.e., every 3–4 years) to remove accumulated sediment near in the inlet and maintain improved hydraulics. The amount of material removed would be 300,000 cy and would require 5 months to complete. Currently, 30,000 cy is dredged annually from the lagoon inlet over a 2-week period. Alternative 2A would require less-frequent maintenance, but the volume of sediment removed and time required would be greater. Each maintenance dredging event would have the potential for intermittent or periodic water quality impacts such as turbidity, but **these impacts would be reduced to less than significant with implementation of physical and regulatory measures, including PDFs and BMPs, as discussed above (Criterion A). No substantial adverse effects would occur associated with maintenance activities.**

Overall, Alternative 2A would provide the most beneficial impact on water and sediment quality. As a result of the increased tidal exchange, improved circulation and drainage pathways, and reduced sedimentation and inlet closures, Alternative 2A would greatly improve water quality and sediment conditions in the lagoon. Stagnant water conditions, which are currently contributing to the elevated bacteria concentrations in the lagoon, would be improved with implementation of Alternative 2A. The greater mixing potential (increased tidal exchange and improved circulation) in the lagoon would reduce bacteria concentrations by allowing greater seawater influence and improving brackish conditions higher in the back waters of the lagoon. In addition, nutrient load would be reduced as a result of the new tidal inlet, which would reduce eutrophication within the lagoon. Sediment exchange between the ocean and lagoon would stabilize, and pollutants settling in the sediment would have less potential to accumulate. The result would be a beneficial impact to water and sediment quality through a reduction in pollutants generated and/or released to the environment, compliance with applicable federal or state standards, and a reduction in potential hazards to human health and biological communities.

Substantial adverse indirect impacts would not occur after the temporary construction phase has been completed because the system would be stable with implementation of Alternative 2A (Criteria A and B), and impacts would be less than significant. Beneficial impacts to water and sediment quality would be expected as circulation and tidal exchange are improved and sedimentation is reduced. No substantial adverse effects would occur to water or sediment quality.

Alternative 1B

<u>Temporary</u>

The temporary impacts associated with the implementation of Alternative 1B would be similar to those discussed for Alternative 2A. Construction activities associated with the proposed development have the potential to impact water quality through the release of pollutants such as sediment, soil stabilization residues, oil and grease, and trash and debris. Soil disturbance would expose soil to erosion from wind and water that could result in sedimentation to receiving surface waters. Increased turbidity could occur during construction activities (i.e., dredging). However, since the magnitude of the dredging and the amount of tidal exchange under Alternative 1B would be less (primarily from the absence of the new ocean inlet), the temporary impacts would also be less at the time of construction. This alternative would require less dredging, grading, and ground disturbance (resulting in less turbidity, disturbed soil area, and erosion potential). Actively managing water levels by temporarily diking off portions of the lagoon being actively dredged would help to control the flow of turbid, disturbed waters and allow for some settling of sediment and other potential pollutants (PDF-22). A cutterhead dredge would be used, which would avoid/minimize the generation of turbidity at the location of the dredge (PDF-22). In addition, following on-site placement of the overdredge material, the overdredge pit would be capped with sand material removed from the proposed inlet location, which would encapsulate the material and prevent it from being introduced into the water column or released into the environment (PDF-22) (M&N 2013) to help minimize sedimentation and turbidity impacts and the potential release of contaminants.

Similar to Alternative 2A, temporary diking and inundation of specific areas during phased construction of Alternative 1B would increase circulation during construction. In impounded areas, the fetch would increase and dredge equipment would provide mechanical circulation, promoting lagoon circulation and turnover. As construction progresses and impounded and dredged areas are opened to tidal action, those areas would have less vegetation and greater tidal exchange, increasing circulation over existing conditions.

BMPs required by the Construction General Permit and County storm water and MS4 permitting would also apply, and would regulate pollutant discharges during initial and maintenance dredging. Overall, through the implementation of project design features and state and locally regulated BMPs, Alternative 1B would not result in changes to hydrologic conditions that would cause sediment or inhibit mixing and **would result in less than significant temporary impacts from pollutants generated or released to the environment in violation of applicable federal or state standards, or that would be hazardous to human health or deleterious to biological communities (Criterion B).**

Because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the potential temporary turbidity that would be generated by lagoon restoration activities, most specifically the dredging operations, would be considered a potentially significant impact (Criterion A). No substantial adverse impacts would occur under NEPA due to PDFs and regulatory requirements that would be met.

<u>Permanent</u>

Alternative 1B would slightly improve flood hydraulics when compared to existing conditions, with correspondingly less sedimentation predicted to occur under the typical and 100-year flood scenarios (M&N 2012c). This alternative would moderately improve water quality conditions by decreasing the existing east basin water residence time from 15 days to 8 days and improve the ability to move sediment through the lagoon. The high bacteria concentrations in the nearshore area would not be improved relative to existing conditions (Table 3.4-4) because, unlike Alternative 2A, Alternative 1B does not include the construction of a new tidal inlet to improve ebb/flood water flow, which would result in reduced bacteria concentrations. Annual inlet maintenance for Alternative 1B would occur.

Sediment removal during intermittent maintenance would be conducted using land-based construction equipment similar to current methods and would create similar intermittent or periodic short-term water quality impacts in the lagoon and beach environments. The volume of removed sediment would be slightly larger at 40,000 cy and would require 4 weeks to complete as opposed to 2 weeks, currently. However, it is anticipated that larger grain-sized sediments would be removed, which would be expected to settle out relatively quickly, thereby minimizing water quality impacts related to sedimentation/turbidity. Alternative 1B would result in a beneficial impact to hydrology by moderately improving lagoon circulation and decreasing stagnation. This condition would be expected to reduce the potential for pollutants to be generated or released to the environment in violation of applicable federal or state standards, or that would be hazardous to human health or deleterious to biological communities over the long term. With the incorporation of appropriate and maintained BMPs that are mandated during these maintenance events, **water and sediment quality impacts would be less than significant (Criteria A and B). No substantial adverse indirect impacts to water and sediment quality have been identified associated with implementation of Alternative 1B.**

Alternative 1A

Temporary

Temporary impacts from implementing Alternative 1A would be similar to those discussed for Alternative 1B; however, Alternative 1A would involve less dredging, grading, and ground disturbance (i.e., reduced turbidity, less disturbed soil area, and less erosion potential) than Alternative 2A and Alternative 1B; therefore, the temporary impacts would be less at the time of construction. Similar to Alternative 2A and Alternative 1B, construction activities associated with Alternative 1A have the potential to impact water quality through the release of pollutants such as sediment, soil stabilization residues, oil and grease, and trash and debris. Soil disturbance would expose soil to erosion from wind and water that could result in sedimentation to receiving surface waters. Increased turbidity could occur during construction activities (i.e., dredging). Under Alternative 1A, areas would not be actively diked off, and the majority of dredging would occur in existing active channels, which are characterized by less silty sediments than those in small tributary channels or densely vegetated areas. In addition, a cutterhead dredge would be used, which would avoid/minimize the generation of turbidity at the location of the dredge (PDF-22). Alternative 1A, like the others, would require a project SWMP and SWPPP and protective BMPs, as described above.

No temporary dikes would be used under Alternative 1A. Circulation would not be affected by Alternative 1A during construction, other than as areas are dredged they would become more exposed to tidal exchange and circulation would be gradually increased throughout the construction process.

BMPs required by the Construction General Permit and County storm water and MS4 permitting would also apply, and would regulate pollutant discharges during initial and maintenance dredging. Overall, through implementation of project design features and state and locally regulated BMPs, Alternative 1B would not result in changes to hydrologic conditions that would cause sediment or inhibit mixing, and **would result in less than significant temporary impacts from pollutants generated or released to the environment in violation of applicable federal or state standards, or that would be hazardous to human health or deleterious to biological communities (Criterion B). However, because the lagoon is listed as a CWA Section 303d impaired waterbody for sedimentation/siltation, the potential temporary turbidity that would be generated by lagoon restoration activities, most specifically the dredging**

operations, would be considered a potentially significant impact (Criterion A). No substantial adverse impacts would occur under NEPA due to PDFs and regulatory requirements that would be met.

Permanent

Alternative 1A would change water quality conditions in the lagoon by providing marginal improvements in circulation and tidal exchange. It would decrease the residence time in the lagoon by 2 days, but would not substantially improve high bacteria concentrations in the lagoon, and the existing inlet would likely continue to be subjected to sedimentation and recurrent closures to ocean exchange.

Alternative 1A would not substantially improve lagoon water quality when compared to existing conditions (M&N 2012c), although assuming the current inlet maintenance program is continued, no substantial additional deterioration of water quality conditions beyond existing conditions would be expected. As a result of conversion continuing to occur in the central basin from mudflats to a more densely vegetated area, tidal exchange and circulation in that focused area may decrease, leading to additional sedimentation and water quality issues. Enlarging the main channel through the basins would enhance the ability of the lagoon to drain fluvial flows and sediments, but not substantially. Existing elevated bacteria concentrations within the lagoon would also be expected to continue due to continued stagnant water conditions that would not be eliminated by this alternative. In terms of long-term intermittent or periodic maintenance, Alternative 1A would be similar to current maintenance with annual sediment removal of approximately 35,000 cy using land-based equipment and taking 2 weeks to complete. Accordingly, **Alternative 1A would have a less than significant impact to lagoon water and sediment quality, but would not alleviate lagoon water quality impairments (Criteria A and B). Substantial adverse indirect impacts to water and sediment quality would not occur with implementation of Alternative 1A.**

No Project/No Federal Action Alternative

The No Project/No Federal Action Alternative would enable existing conditions to continue. Tidal flows would continue to be restricted due to the narrow and meandering channel between Coast Highway 101 and the NCTD railroad. Tidal ranges would remain substantially muted for both high and low tides, which would continue to be increasingly and progressively muted from the west basin through the east basin. The need for maintenance intervals and inlet opening would continue to occur annually removing 30,000 cy of sediment and taking 2 weeks to complete. These maintenance intervals would also be expected to temporarily increase localized turbidity, similar to existing conditions. However, larger grain-sized sediments would be removed during maintenance intervals, which would settle out relatively quickly, minimizing water quality impacts related to sedimentation/turbidity. No additional benefit to lagoon water and sediment quality would be provided. No new impacts would be anticipated by the No Project/No Federal Action Alternative; however, conditions would remain unchanged and a degraded lagoon environment would continue to decline. **No substantial adverse effects would be anticipated under the No Project/No Federal Action Alternative, and impacts would be less than significant (Criteria A and B).**

Materials Disposal/Reuse Study Area

The disposal and/or reuse of dredged sediments/excavated soils during construction for the three alternatives considered is addressed below. The No Project/No Federal Action Alternative is not discussed further since it would not involve the disposal of dredged sediments outside of the EPA-approved LA-5 site. Materials placement required as part of inlet maintenance is discussed above under permanent impacts for each of the alternatives. Criterion A is not discussed in this section as materials disposal and/or reuse would not alter hydrologic conditions or circulation patterns that would inhibit mixing or cause sedimentation.

Alternative 2A–Proposed Project

Alternative 2A would involve placement of material on-site, and could include placement at offshore, nearshore, and/or onshore sites along the neighboring coast. Lagoon sediments have been tested and found to consist of two stratigraphic layers, as described below.

The uppermost layer is relatively thin and composed of silts, clays, and organic matter. Evidence from sediment testing shows that some areas within this layer contain some harmful chemicals (i.e., DDD, DDE, and PCBs). Sediment testing found low levels of Aroclor PCBs in upper and lower layers within the East Basin. These values were found to be above their respective ERL screening levels (M&N 2013). This fine organic upper-layer material is not suitable for beach reuse and would require disposal. Under Alternative 2A, this material would be disposed of in the overdredge pit proposed in the central basin, based on initial coordination with the Corps and EPA. Following placement of the silty upper material, the overdredge pit would be capped by material dredged from the proposed inlet location, which would encapsulate the material and prevent it from being introduced in the water column, essentially isolating it from the water column and preventing it from causing water quality impacts.

The lower layer (approximately 2 to 3 feet bgs) in the central basin is primarily sand with approximately 10 percent fines and is at least 80 feet thick (M&N 2010). The age of the sediment layer suggests that anthropogenic sources of harmful chemicals are not contained in these alluvial deposits. This material has been analyzed compliant to Corps and ITM requirements and has been found suitable for reuse on beaches (M&N 2013). Chemistry data was collected from the proposed beneficial reuse placement sites as a component of the SAP. The sediment quality of the placement sites was determined to be chemically compatible with the source site. The upper layer of sediment within this area has been identified as having DDT levels above the ERL threshold, and would be sequestered within the overdredge pit, as discussed above. Since deeper material has been determined suitable for reuse and the poorer quality material would be safely sequestered on-site, **less than significant impacts from its disposal/reuse would be expected (Criterion C)**. **No substantial adverse impacts would occur.**

Up to 1.4 mcy of material would be placed in various potential locations on-site, offshore, nearshore, and onshore (see Table 2-20). When depositing material, some sediment fraction would remain suspended in the water column for various lengths of time depending on particle size and water movement. There would also be a degree of sediment resuspension in the water column of the deposition area, as well as the area of the seafloor where resident sediments would be physically disturbed and dislodged for a short period. Using a construction strategy that creates an overdredge pit would enable the majority of material produced by the project to be used beneficially as littoral cell nourishment, while providing a location on-site for materials unsuitable for beneficial reuse (either due to contamination or grain size).

Sediment plumes associated with placing material at reuse or disposal sites in the ocean would be subject to dispersion and dilution by ambient currents, wind, and wave action. The behavior and fate of suspended sediment plumes would vary substantially depending on the nature of the deposition operations, characteristics of the bottom sediments, and current patterns and oceanographic conditions. Regardless, the areas affected can be characterized in three ways:

- *Initial mixing zone*: the area where deposition operations dominate the process and induced currents are more important than ambient currents;
- *Near-field zone*: the area where the plume area is characterized by rapid particle settling and changes in suspended sediment concentrations with distance from the deposition; and
- *Far-field zone*: the area where the total load in the plume is slowing and diffusion is the same order of magnitude as particle settling.

In general, the initial mixing zone is associated with the area in the immediate vicinity of the point of placement (in nearshore or offshore sites), whereas the transition between the near-field to the far-field zones typically occurs within several hundred feet of the point of placement. The location in the far-field zone at which the plume is no longer distinguishable from background conditions would vary in relation to the differences in turbidity and suspended sediment levels in the plume and adjacent receiving waters.

The vertical (depth-related) extent of plumes depends on the initial displacement of bottom sediments, physical characteristics and settling velocities of the sediment particles, and vertical mixing characteristics of the water column. For example, the vertical distribution of sand-sized particles disturbed when disposed material strikes the bottom may be confined to the near-bottom water layer, particularly when the bottom sediments consist of coarse-grained, rapid-settling particles and a natural density gradient is present in the water column that limits vertical mixing. In contrast, disturbed fine-grained sediments may remain suspended and distributed throughout the water column for long periods, particularly during winter (unstratified) conditions. Similarly, plumes generated by placement activities can extend throughout the water column as particles settle at varying rates depending on particle size and depth-varying current speeds.

The elevated suspended solids concentrations in turbidity plumes reduce water clarity/light transmittance, and increase discoloration. Table 3.4-5 shows the estimated sediment plume length expected to occur from depositing spoils at disposal/reuse sites in onshore, nearshore, and offshore locations (Appendix H). These estimates assume a median particle size of 0.20 millimeter (mm), as determined through sediment characterization (M&N 2010) and a settling velocity of 0.08 feet per second (ft/s), which is the material anticipated for Alternative 1B and Alternative 2A. For Alternative 1A, where fines would be deposited at LA-5, a smaller median grain size was used.

Table 3.4-5
Estimated Sediment Plume Length at Potential Disposal/Reuse Sites

Disposal/Reuse Location	Current Velocity (knots)	Depth (ft)	Plume Length (ft)
Onshore	1.5–3.0	10	313–625
Nearshore	1.5–3.0	15	469–938
Offshore	0.5–1.5	25	781–1563
Offshore*	0.5–1.5	25	2,083–4,166

*assumes median particle size of 0.10 mm and a settling rate of 0.03 ft/s (WEF 1991)
Source: *Marine Biological Resources Technical Report for the San Elijo Lagoon Restoration Project* (Appendix H)

The estimated plume distance on any given day would vary according to the grain size characteristics of the material, turbulence, current speed, and to what depth in the water column the particles are resuspended. Use of the overall mean grain size diameter indicates average plume extent. Silt/clays resuspended during dredging may travel longer distances than indicated in the table.

The primary changes to water quality expected from materials placement associated with Alternative 2A would be temporary and localized increases in turbidity and suspended sediment concentrations. With a settling velocity of 0.08 ft/s, a sediment particle would settle to the ocean floor in approximately 5 minutes at a depth of 25 feet. However, for the deepest locations offshore (SO-5 and SO-6), this alternative would involve placing materials via a vertical pipe extending from the barge downward toward the ocean floor to reduce the drop height and settling time (and potential sand drift and loss) (PDF-42). The estimates in Table 3.4-5 are expected to represent worst-case scenarios (Appendix H). Due to the temporary nature (approximately 5 minutes) of turbidity during placement, less than significant impacts would be expected from the sediments placed on the ocean floor and no substantial adverse impacts would occur. As part of compliance with the Section 401 water quality certification required from the RWQCB, water quality monitoring will be conducted to ensure water quality standards are met (PDF-43). In addition, a sediment management plan would be developed and implemented to test dredged materials for proper placement in the overdredge pit or for off-site transport and proper disposal, and to be in compliance with local, state, and federal regulations (HAZ-3). With implementation of the measure, the disposal of dredged sediments/excavated soils would **not violate applicable federal or state standards, be hazardous to human health, be deleterious to biological communities, cause substantial adverse changes to water or sediment quality, cause toxicity or bioaccumulation of contaminants in aquatic biota, or negatively affect wildlife habitat. No significant impacts would occur (Criteria B and C).**

Alternative 1B

The impacts related to this alternative would be slightly less than those associated with Alternative 2A. This alternative would dispose/reuse approximately 1.2 mcy of material dredged from the lagoon. This alternative would also utilize a construction strategy creating an overdredge pit and providing material for littoral cell nourishment. Potential sites for placement would be the same as those for Alternative 2A, and water quality monitoring in compliance with the water quality certification will be required (PDF-43). **No substantial adverse effects would occur, and impacts to water and sediment quality would be less than significant with implementation of Alternative 1B (Criteria B and C).**

Alternative 1A

Alternative 1A would not produce material suitable for reuse within the littoral zone and up to 160,000 cy of silty surface material would require disposal at the offshore disposal site, LA-5. An overdredge pit would not be constructed for on-site disposal. Dredged material would have a high proportion of fines, ranging from approximately 20 percent to 78 percent from the west to the east basin of the lagoon, respectively. The SAP (Appendix A) showed that some areas within the upper layer of fine material have pesticide (i.e., DDD and DDE) contamination and PCB levels that meet or exceed their ERLs (Table 3.4-2). These results indicate that this material may be suitable for use at LA-5. If Alternative 1A is selected for implementation, additional Tier 3 testing would be required prior to Corps and EPA approval of the proposed disposal. Should the materials be determined to be not suitable for disposal at this location, the material would be sequestered on-site in built transition or nesting areas.

Since the upper strata material dredged from the lagoon would be discharged near the surface of the ocean (i.e., without the benefit of a vertical discharge pipe used for the more valuable beach sand spoils), the resulting plume would be expected to remain suspended in the water column for a much longer period of time (i.e., hours) than that for the deeper, heavier material dredged in the Alternative 2A and Alternative 1B (Appendix H). The plume's travel distance and dilution would depend on ambient currents, wind, and wave action existing at the time of disposal.

Assuming an offshore water column current of 1 knot at LA-5 at the time of disposal, the plume would be visible for approximately 13 minutes and travel approximately 1,130 feet (Appendix H). Material disposed at LA-5 would have to comply with the requirements set by the Corps and EPA (EPA 1987), and, as noted above, preliminary coordination with the Corps and EPA indicates that the level of contamination appears appropriate for disposal at LA-5 (M&N 2013). If approval is not obtained from the Corps and EPA for disposal at this location, the material would be sequestered on-site. As a result, materials disposal for Alternative 1A would not violate applicable federal or state standards, create hazardous human health conditions, or cause deleterious effects to pelagic and benthic biological communities. **No substantial adverse effects to water and sediment quality would occur, and impacts would be less than significant (Criteria B and C).**

3.4.4 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

A number of project design features that minimize erosion and the release of pollutants into the environment have been incorporated into the project, including use of a cutterhead suction dredge and capping the overdredge pit, when applicable.

However, the following mitigation measures are required for CEQA significant impacts related to turbidity.

Mitigation measure Water Quality-1 would be required under CEQA for implementation of Alternative 2A, Alternative 1B, and Alternative 1A. Mitigation measure Water Quality-2 would be required under CEQA for implementation of Alternative 2A and Alternative 1B.

Water Quality-1 All additional conditions, BMPs, and requirements that are identified by regulatory agencies prior to project initiation as part of the permitting process for the project, including Section 404 permit, Coastal Development Permit, Section 1601 permit, Section 401 Water Quality Certification, and the NPDES MS4 permit, must be implemented. Compliance with those permit conditions shall be monitored through the construction monitoring program and the contractor shall certify to the engineer of record that they have been completed.

Water Quality-2 Water levels shall be actively managed by using a cutterhead dredge and/or temporarily closing the lagoon inlet. The overdredge pit shall be capped with sand material to encapsulate material and prevent it from introducing turbidity or pollutants into the water column or released into the environment. The contractor shall certify to the permit holder that the dredge operations are not responsible for release of sediments into the water column at levels resulting in increased downstream sedimentation.

3.4.5 Level of Impact after Mitigation

CEQA conclusion: Impacts to water quality associated with turbidity would be reduced to less than significant with implementation of the mitigation measures above.

NEPA conclusion: No substantial adverse impacts associated with water or sediment quality have been identified due to implementation of the SELRP.

This page intentionally left blank.